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A method of data hiding in QR code using image steganography

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ABSTRACT

As the day to day analysis, we need to keep our data safe so that our private data is safe. It can be applied through steganography. Also, we do add the QR code for the purpose of increasing the security and ease to access the information which is been sent. Steganography is being used with AES algorithm and LSB steganography. QR code is used to enhance the security.

Keywords: Steganography, Encryption, QR code.

1. INTRODUCTION

Steganography is an art of hiding the data under cover. The object can be an image, audio, video etc. The basic terms in steganography are cover, secret message, key, QR code and Embedding Algorithm. The cover can be either image, audio, video. The secret message is the message which needs to be transferred through the medium of the cover message. The key is medium through which we can extract the message from the digital medium. The key is hidden in the digital medium. The embedding algorithm is used to hide the data and key and send through the network so that the intruder will not know where exactly the data is hidden or may not know that data is actually hidden in the cover message. After the embedding of the message at the receiver end, the reverse algorithm is used to extract the message from the cover message and key from the QR code.

2. STEGANOGRAPHY

It's the oldest technique of network security. It uses a cover to hide the data without using any secrecy. It uses the public key to share and get the information done.

LSB Technique

The LSB technique is one among the oldest technique of steganography. In this technique, there are few steps

- Select the image to hide the data in it.
- Choose the data to be hidden in the message.
- Now create an image file by embedding both the data and the image.
- To get the original message use the reverse algorithm and scan the host image.

QR Code

QR code is known as Quick Response two-dimensional code used in marketing and advertisement sector. In this, it is used to hide the key entered or generated at random. The QR code has more storage capacity when compared to the barcode. A QR code has black squares with a white background which can be scanned easily. The alphanumeric key stored in horizontal or vertical components of the image.

3. ALGORITHM

Begin

User required entering the email and password

If Email is valid And Password is valid

Then

Login Successful

Else

Invalid Email or Password

End If

User required entering the email and password

If Email is invalid And Password is invalid

Then

Select Register

Enter the Name

Enter the email address

Enter the password
 Confirm Password
 Enter the Phone Number
 Select Save
 Select the Secret message, Generate or enter the key manually
 Generate the QR code for the Key
 Select the message for encryption
 Generate the round keys
 Initialize the plaintext
 Perform ten rounds combination
 Final text obtained is encrypted text
 Save the encrypted message
 Convert the encrypted message into a binary format
 If binary bits are less than image resolution
 Change red component of the first pixel with a first binary value
 Change green component of the first pixel with a second binary value
 Change blue component of first nary value with the third value
 Select next pixel and repeat the process until binary characters are emptied
 Else
 Image resolution is not compatible
 End If
 Return Combine the Image with QR code.
 Select the image file and QR code
 If the Image file is matched Then
 Calculate the red component of the pixel
 Calculate the green component of the pixel
 Calculate the blue component of the pixel
 Select next pixel and repeat the process until all encrypted characters are obtained
 Else
 Error in Image
 End If
 If QR code Image is matched Then
 Generate the key from the QR code image
 End If

If Encrypted Message and QR code is matched Then
 Generate the original text
 End If
 Return Message
 If the message in sender and receiver database is matched Then
 Message is correct
 Else
 Error in Message
 End If

4. IMPLEMENTATION

Based on the proposed algorithm a system is developed in C# that implements the algorithm. Figure 1 shows the embedding of data into the image.



Fig. 1. Steganography process

The next figure shows the extraction of the data which is being sent to the user.



Fig. 2. Steganography reverse process

5. CONCLUSION AND FUTURE WORK

The method of steganography is considered to be the oldest method and safe when comparing it with cryptography algorithms. The information may be changed for misleading or changed or tampered. The proposed system provides security to data from unauthorized access. Here we are storing and sending an image file rather than text message itself. There is a limitation that a large text file which are higher than image resolution are not possible.

Imply the same method to the text file rather than text message. Try to implement the same method in the video file for both text message and text file or document. Use the RSA and Diffie-Hellman algorithms for the exchange of keys to avoid man in the middle attack. Get a different transfer

medium other than email to send the secret message or document file.

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